SEMESTER END EXAMINATION, MAY, 2024

Course Name: - B.Tech. **Semester:- II**

Paper Name: - Engineering Physics **Paper Code:- TBS 201**

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

समय–3 घण्टे+ 20 मिनट प्रति घंटे अतिरिक्त–दृष्टि बाधित एवं सह लेखक परीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries 3 mark. **All questions are compulsory.**
- Section B- Answer any **5 out of 7** given questions in maximum one hundred fifty (150) words. Each question carries **7 marks.**
- SectionC- Answer any **2 out of 3** given questions in maximum three hundred (300) words. Each question carries **10 marks.**

निर्देश:

- प्रश्न पत्र मे तीन खण्ड अ, ब, स है।सभी खण्ड अनिवार्य हैं।
- खण्ड–अ मे प्रत्येक प्रश्न तीन अंक का है।**सभी प्रश्न अनिवार्य हैं।**
- खण्ड–ब मे **सात प्रश्नों में से किन्हीं पाँच** प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें। प्रत्येक प्रश्न **सात अंक** का है।
- खण्ड–स मे **तीन प्रश्नों में से किन्हीं दो** प्रश्नों के उत्तर अधिकतम (250-300) शब्दोंमेंदें। प्रत्येक प्रश्न **10 अंक** का है।

Section - A (खण्ड–अ)

Objective Questions(वस्तुनिष्ठप्रश्न)

1. Answer allthe following questions. **5x3 =15**

निम्नलिखित सभी प्रश्न अनिवार्य है।

i) A particle of rest mass m_0 moves with speed $c/\sqrt{2}$. Its momentum will be:

(a) $m_0c/\sqrt{2}$

(b) m_0c

(c) 0

(d) ∞

ii) Michelson-Morley experiment showed that:

(a) Newtonian Mechanics is correct for all low and high velocities.

(b) There is an absolute ether frame.

(c) There is no absolute ether frame, but all frame are relative.

(d) Velocity of light is relative in all cases.

iii) The Young's experiment established that

(a) Light consists of waves

(b) Light consists of particles

(c) Light is neither wave nor particle

(d) Light is both wave and particle

iv) The Maxwell's equation $\oint \vec{E}.\vec{dl} = -\oint \frac{\partial \vec{B}}{\partial t}.\vec{ds}$ is a statement of

(a) Gauss's Law

(b) Ampere's Law

(c) Faraday's Law

(d) Modified Ampere's Law

v) If the Kinetic energy of a particle is doubled, then its de-Broglie wavelength:

(a) 2 times

(b) $\frac{1}{2}$ times

(c) $\sqrt{2}$ times

(d) $\frac{1}{\sqrt{2}}$ times

Section – B (खण्ड–ब)
Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any five of the following questions in maximum 150 words. **5x7=35**

निम्नलिखित में से किन्हीं पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दो में दें।

i. Deduce the relativistic velocity addition theorem. Show that it is consistent with Einstein's second postulate.

ii. Derive the formula $E^2=p^2c^2 + m_0^2c^4$, where symbol's have their usual meanings.

iii. State Heisenberg uncertainty relation. Using Heisenberg uncertainty relation find an expression for Bohr's radius of atomic orbit.

iv. What do you understand by orthogonality condition, normality condition, probability function and expectation value of wave function ψ? Find an expression for total energy and momentum operator.

v. How Laser Light is dissimilar with ordinary light? Give any 5 applications of Laser Light.

vi. Give differential form of Maxwell's equation of EM waves. Show that EM waves in free space moves with speed of light.

vii. Discuss Newton's ring experiment. Using Newton's ring experiment how can we determine the refractive index of a given liquid?

Section – C (खण्ड–स)
Descriptive Questions (विवरणात्मकप्रश्न)

3. Answer any two of the following question in maximum 300 words. **2x10=20**

निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर अधिकतम 300 शब्दों में दें।

i) Describe Fraunhofer diffraction due to single slit and deduce the position of Maxima and minima. Show that the relative Intensities of successive maxima are nearly $1:\frac{4}{9\pi^2}:\frac{4}{25\pi^2}:\frac{4}{49\pi^2}:\cdots\cdots$

ii) Show that the Electromagnetic waves are transverse in nature. Also find an expression for the impedance of Electromagnetic waves.

iii) What do you understand by induced absorption, spontaneous emission and stimulated emission? Give construction and working of He-Ne Laser with neat energy level diagram.